Kindly substitute the following for the second full paragraph on page 3:

A3

It is still another object of the present invention to provide a low profile tracking phased array antenna for use on either a fixed or mobile consumer commercial satellite terminal for equatorial satellite constellations.

Kindly substitute the following for the third full paragraph on page 3:

A4

It is still a further object of the present invention to provide a tracking phased array antenna that is suitable for use on a commercial satellite terminal for equatorial satellite constellations and is intended as a consumer product which provides high performance, is relatively inexpensive, and has a low profile.

Kindly substitute the following for first full paragraph on page 6:

A5

Figure 1 illustrates an environmental view of the disclosed antenna in accordance with a preferred embodiment of the present invention. As shown, a preferred antenna 10 is positioned in a fixed position on the ground and is in communication with a plurality of orbiting satellites 12 to transmit signals thereto and receive signals therefrom. Another antenna 10 is attached to an automobile travelling along the ground which is also in communication with a plurality of orbiting satellites 12 to transmit signals thereto and receive signals therefrom. The disclosed antenna may also be attached to other mobile vehicles such as aircrafts or boats. The satellites 12 are preferably medium earth orbit equatorial satellites.

Kindly substitute the following for the paragraph that begins on page 6 and ends on page 7:

A6

As shown in Figure 2, the antenna 10 includes a plurality of antenna radiation elements 14 that are positioned on a circular plate 16. The circular plate 16 is a rotating plate that rotates about a center axis, as will be described further herein.

Kindly substitute the first full paragraph on page 7:

A7 Cont.

In a preferred embodiment, the rotating plate 16 is less than one inch (1") thick and has a diameter of fifteen inches (15") or less. Obviously, the dimensions of the rotating plate 16 may vary. However, the greater the diameter and thickness, the larger and more costly the antenna 10 will become. As shown in Figure 3, the antenna radiation elements 14 are preferably constructed using a plurality of parallel slotted waveguides 18. However, a variety of different antenna radiation elements may instead be utilized, such as patch arrays.

A7 Concld.

The operation of the disclosed antenna configuration is described in a receive mode only. The corresponding transmission mode operation can be easily understood by one of skill in the art via reciprocity.

Kindly substitute the paragraph that begins on page 7 and ends on page 8:

A8

In accordance with a preferred embodiment, each slotted waveguide element 18 is approximately 10 wavelengths long. In one embodiment, 16 long waveguide elements 18 are positioned on the circular plate 16. The waveguide elements 18 are grouped into two groups and are interlaced, as shown in Figure 3, such that waveguide 1a and waveguide 1b begin at opposite ends of the circular plate 16 and overlap one another. Each of the individual waveguides are preferably separated by one-half wavelength (½ λ). Therefore, the total aperture in which the waveguide elements are positioned is about 10 x 10 wavelength in a square and the expected peak gain of a straight out or boresight beam from this aperture is about 28 to 30 dB. While the circular plate 16 rotates, rotating the antenna radiation elements 14 therewith, the vertical position of the circular plate 16 remains generally stationary. It should be understood that the number of waveguides positioned on the circular plate may vary, however, the preferred number of waveguide elements is between 10 and 20. Further, the distance between the waveguide elements and their length may also vary.

Kindly substitute the following for the paragraph that begins on page 10 and ends on page 11:

A9

Specifically, as shown in Figure 4, each of the pair of sixteen slotted waveguides 18, numbered 1 through 8 for purposes of illustration, will individually intercept an incoming wave. The waves will be intercepted by the phased array elements 18. The top portion of Figure 4 is a schematic of a Ku band receive array. Similar architectures can be utilized for other frequency bands, such as L-band, S-band, and Ka band. Obviously, the present invention may be utilized for each of these frequency bands. As schematically represented by reference numerals 34, 36, the waves received at the waveguide elements 18 are processed by circuitry associated with each of the elements. The incoming wave is then amplified by a respective linear amplifier 38 before being passed to a conventional band pass filter 40 where the signal is filtered. After the signal has been filtered, it is then coded at a code generator 42 before being transferred to a multiplexer 44. The multiplexed signal is passed to an amplifier 46 before being multiplexed and then converted to a digital stream 48 by an analog-to-digital converter 50.

Kindly substitute the following for the paragraph that begins on page 13 and ends on page 14:

A10

Similar to the antenna disclosed in the prior figures, the entire receiving antenna and tracking processing of this preferred embodiment is through the low profile, one dimensional radiation elements 14. The radiation elements 14 are again preferably placed in parallel on the circular plate 16 which rotates about its center axis. The long radiation elements 16 are also aligned along the intended incoming waveform by the rotating circular plate 16 and then subjected to multiple beamforming through fast fourier transforms (FFT) at the digital multibeam beamforming device 54. The outputs of the digital multibeam beamforming device 54 through FFT are associated with signals from various directions covered by the different (contiguous) beams. The outputs of the FFT will be fed into a retrodirective processing mechanism, as described below, to determine where the intended signal is coming from and then to send the transmit signal to the same direction. The low cost tracking is accomplished by retrodirectivity. The history of the beam positioning will be stored in the terminal as a reference for the satellite emphmeris.

Kindly substitute the following for the first full paragraph on page 14:

A11

The received signals are again multiplexed into a single microwave stream via known CDMA techniques to reduce the component counts and the ultimate cost of the ground terminals. Incorporating the unique multiple digital beam forming technique with multiplexing provides contiguous multiple receive beams. The receiver monitors the signals from all the multiple beams simultaneously. The outputs of the digital multiple beamformer are then indexed through a set of orthogonal codes, such as Hadamard code, each of which represents the unique beam direction. By identifying the code of the signals locked onto the receiver, the location where the signal is coming from has been identified as well as the corresponding phase slope of the received aperture.

Kindly substitute the following for the first full paragraph on page 16:

A12

As for equatorial non-geosynchronous constellations, users can use the disclosed terminal to avoid interruption during handover. During transition, there will be one satellite coming in and another satellite going out from a user's FOV. Furthermore, there is only a limited time window when the satellites are at the same elevation or near the same elevation, but at a different azimuth angle. The disclosed antenna can form two beams pointed towards these two satellites simultaneously. Consequently, it can provide the capability of "connect before break" during the hand over phase.